IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:	) Date: July 24, 2009
Leon A. Pintsov, et al.	) Attorney Docket No.: F-708
Serial No.: 10/736,077	) Customer No.: 00919
Filed: December 15, 2003	) Group Art Unit: 3621
Confirmation No.: 3243	) Examiner: Joshua A. Murdough

Title: METHOD AND SYSTEM FOR GENERATING CHARACTERIZING INFORMATION DESCRIPTIVE OF SELECTED PRINTED MATERIAL SUCH AS A PARTICULAR ADDRESS BLOCK

CORRECTED APPELLANT'S BRIEF ON APPEAL

Sir:

This brief is in furtherance of the Notice of Appeal filed in this case on February 5, 2009; the April 2, 2009, Notification of Non-Compliant Appeal Brief (37 CFR § 41.37) and the July 10, 2009 Notification of Non-Compliant Appeal Brief (37 CFR § 41.37).

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I. Real Party in Interest

Pitney Bowes Inc. is the real party interest.

II. Related Appeals and Interferences

There are no related Appeals and Interferences.

III. Status of Claims

(a) Claims 1-5, 7-16, and 18-26 are in the application.
(b) Claims 21 - 26 have been withdrawn.
(c) Claims 6 and 17 have been cancelled.
(d) Claims 1-5, 7-16, and 18-20 are rejected.
(e) Claims 1-5, 7-16, and 18-20 are on appeal.

IV. Status of Amendments

An Amendment subsequent to the Final Rejection of November 7, 2008, was filed on January 23, 2009. This Amendment was not entered.

V. Summary of Claimed Subject Matter

The present invention relates to a compact characterization of a block of printed text which will distinguish the selected block of text from other such blocks. More particularly, it relates to the problem of providing an image-based characterization of a printed address block which can be incorporated into a digital postal indicium.

Claim 1 is one of the two independent claims in this Patent Application.

Appellants invention claimed in claim 1, claims a method for generating characterizing information including a plurality of descriptors for a selected block of printed material. The method includes the following steps:

a) scanning said printed material; (Paragraph 0011, Page 6, Lines 1-8)

b) applying a predetermined set of algorithms for computing characterizing information; (Paragraph 0011, Page 6, Lines 1-6)

c) determining estimates of robustness for each algorithm in said predetermined set of algorithms; (Paragraph 0037, Page 14, Lines 1-8)

d) selecting, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information; (Paragraph 0045, Page 17, Lines 1-5, Paragraph 0050, Page 19, Lines 1-8)

e) including said characterizing information into a secure indicia; (Paragraph 0024, Pages 8 and 9, Lines 5-13)

f) scanning said indicia and said printed block; (Paragraph 0005, Pages 2 and 3, Lines 11-19)

and

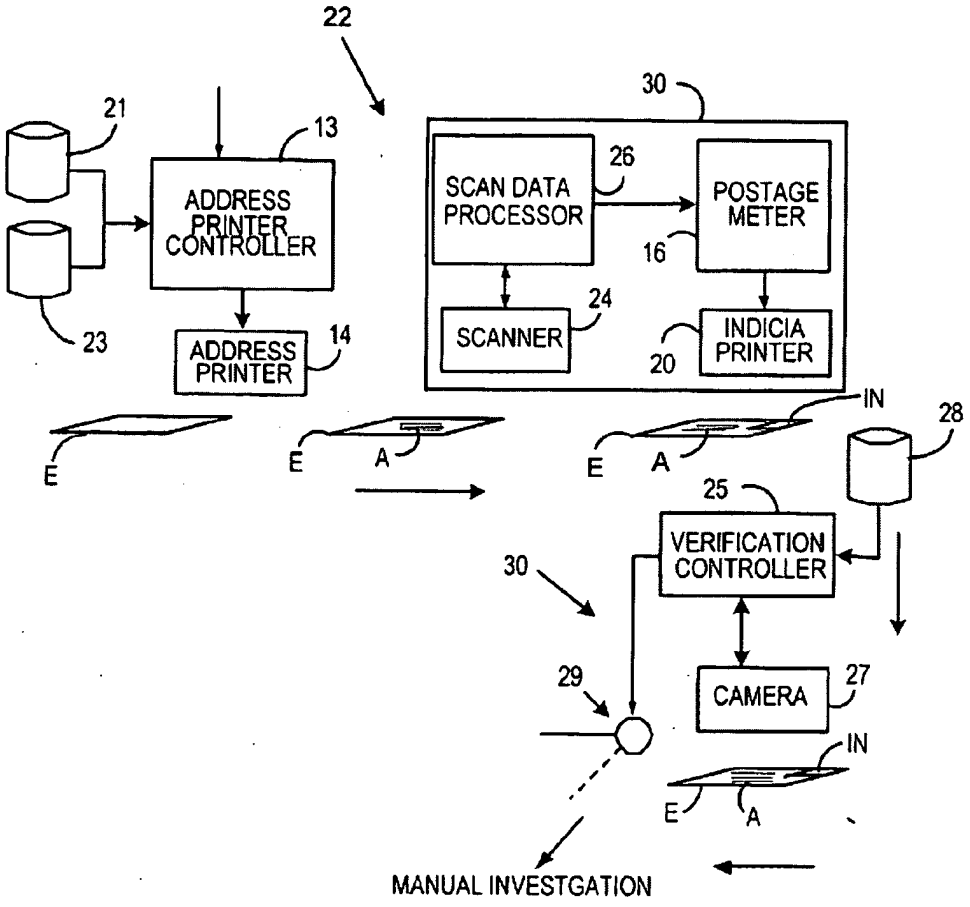
g) determining uniqueness of said indicia using information obtained from step f. (Paragraph 0053, Page 20, Lines 1-9, Paragraph 0054, Pages 20-21, Lines 1-10)

Appellant's invention is shown in paragraph 0011 of page 6, paragraph 0024 of page 8 to paragraph 0028 of page10, paragraph 0035 of page 14 to paragraph 0045 of page 17 and in paragraphs 0053 – 0054 of pages 20-21 of Appellant's specification. Claim 1 is also illustrated in Figs. 2, 3, 5-8 and 10.

[0011] In accordance with yet another aspect of the subject invention an indicium including the characterizing information is verified by: a) scanning images of said indicium and said other printed material from said object; b) inputting a combination of first descriptors comprising the characterizing information from said indicium image; c) identifying characterizing algorithms used to generate said first descriptors; d) applying said identified algorithms to said image of said other material to generate second descriptors; e) comparing

said first and second descriptors; and f) if said first and second descriptors do not match, diverting said object for further inspection.

FIG. 2

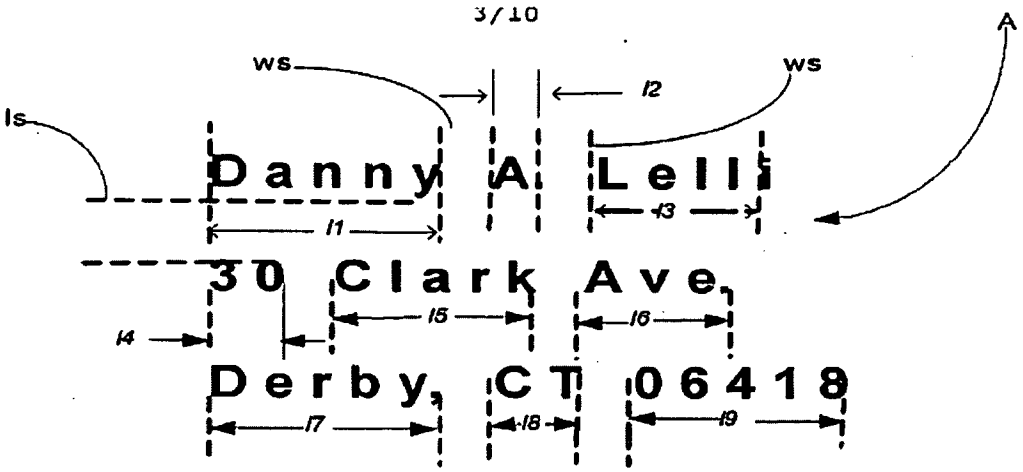


[0024] In Figure 2, mailing system 22 includes address printer controller 13, address printer 14, postage meter 16, and indicia printer 20, which are substantially similar to the corresponding prior art elements shown in Figure 1. System 22 differs in including data stores 21 and 23 communicating with controller 13 and in the manner in which controller 13 generates characterizing

information. Data store 21 stores a plurality of characterizing of characterizing algorithms, as will be described further below, and data store 23 stores at least a print/scan filter which, when applied to the pristine image generates a filtered image which approximates the transformation of the pristine image by the printing and scanning processes. In other embodiments, data store 26 stores one or more defacing filters which simulate blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images. Together, meter 16, printer 20, form secure postal indicia printing system 22.

[0025] Figure 2 also shows verification controller 25, camera 27, data store 28, storing the characterizing of characterizing algorithms used in system 22, and diverter 29; which together comprise verification system 30 for comparing address block A with information recovered from indicium IN and diverting mail pieces which do not match, as described above. (System 30 is typically located at a postal facility distant from system 22.) Except as to programming of controller 25 to carry out the comparison algorithm of the subject invention, as will be described further below, operation of verification system 30 is substantially conventional and need not be described further here for an understanding of the subject invention.

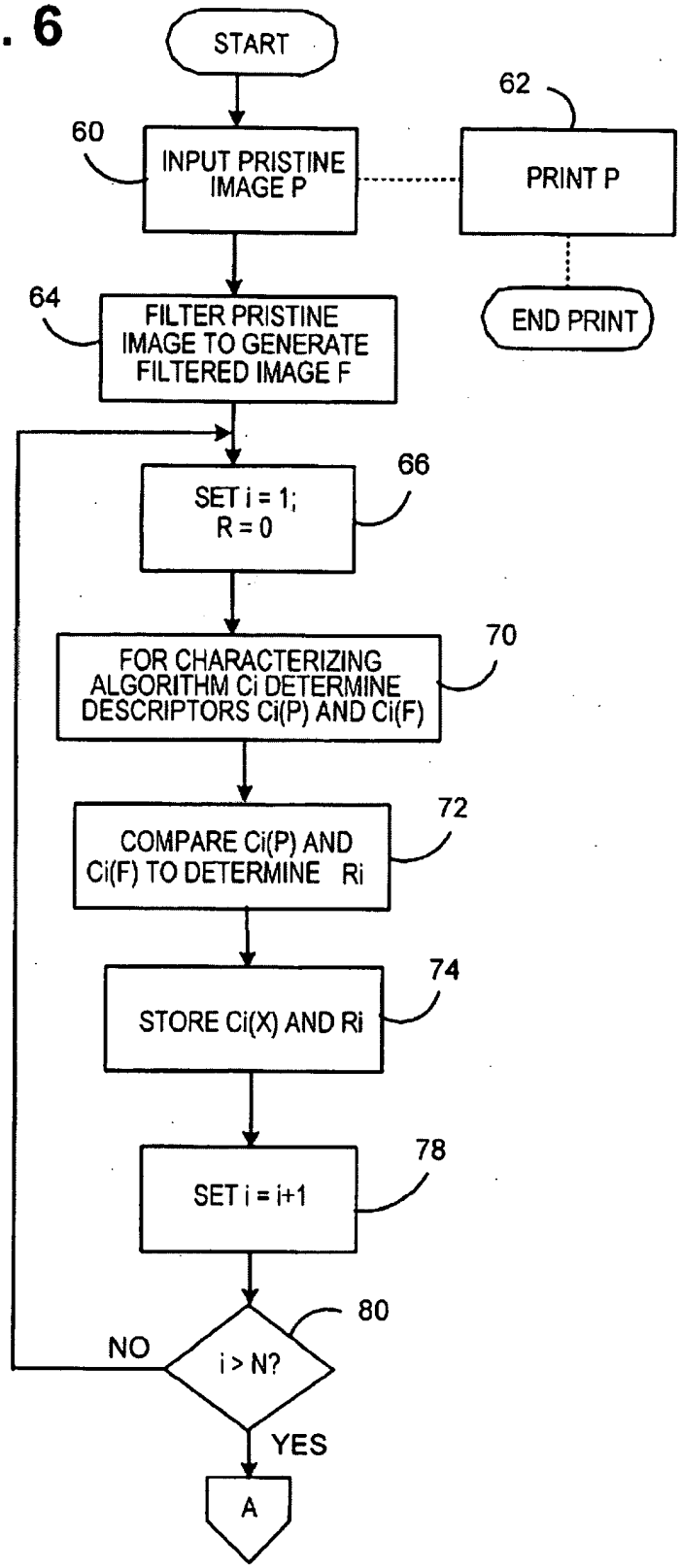
[0026] Three methods for generation of image-based characterizing information which are believed to provide improved compactness and robustness in accordance with the above object of the invention, have recently been developed by the assignee of the present application and are described below as illustrative of the type of characterizing algorithms which can be used with the subject invention. Numerous other algorithms will be apparent to those skilled in the art and particular choices of algorithms to be used form no part of the subject invention, except as may be recited in the claims below and equivalents.



[0027] A characterizing algorithm where the characterizing information comprises measurements of the lengths of the individual words which make up address A, is shown in Figure 3. Address block A is parsed to identify individual words by first identifying line spaces *ls* by determining the occurrence of large amounts of horizontal white space between blocks of printed text, and then identifying word spaces *ws* by determining the occurrence of large amounts of vertical white space between blocks of printed text (as shown with respect the first line of address A). Word lengths *l*1 through *l*9 are then determined for address A. Preferably, word lengths are taken (measured in pixels) from the edges of word spaces *ws* (or the address edges) as shown, but can be taken in any convenient manner, such as along the midline of the words.

[0028] It is believed that using four or fewer bits per word would not be useful in postal applications. Thus, in a preferred embodiment, the number of bits used can be selected to encode all words in the address, and two control bits will be sufficient to indicate selection of five to eight bits per word to encode the length of the word. In other embodiments, a fixed number of words in the address, for example the first eight, can be scanned at a fixed number of bits per word; eight in this case, since control bits would not be needed to specify the number of bits per word.

FIG. 6


START
60
INPUT PRISTINE IMAGE P
62
PRINT P
END PRINT
64
FILTER PRISTINE IMAGE TO GENERATE FILTERED IMAGE F
66
SET i = 1; R = 0
70
FOR CHARACTERIZING ALGORITHM Ci DETERMINE DESCRIPTORS Ci(P) AND Ci(F)
72
COMPARE Ci(P) AND Ci(F) TO DETERMINE Ri
74
STORE Ci(X) AND Ri
78
SET i = i+1
80
i > N?
NO
YES
A

[0035] Figure 6 shows a flow diagram of the operation of controller 13 in accordance with one embodiment of the subject invention. At step 60, controller 13 obtains a pristine digital image, P, of address block A from a conventional source (not shown) such as a data processing system for preparing a bulk mailing. At step 62, controller 13 carries out printing of address block A in a conventional manner. Preferably, this printing process is carried out concurrently with the selection of a characterizing algorithm but, in other embodiments of the subject invention, printing of address block A can be carried out sequentially or by a separate processor.

[0036] At step 64, controller 13 inputs a print/scan filter which simulates the printing process of printer 14 and the scanning process to be carried out at a remote postal facility from data store 26 and applies it to image P to generate a filtered image, F, which approximates the image which will be scanned from the mail piece at the postal facility. And at step 66 sets index i equal to 1 and variable R equal to 0.

[0037] At step 66 controller 13 sets index i = 1 and variable R = 0, and at step 70 applies the ith characterizing algorithm C_i to images P and F to generate corresponding descriptors $C_i(P)$ and $C_i(F)$; each comprising a sequence of M characterizations, or values, $C_i(P)_1$ through $C_i(P)_M$; $C_i(F)_1$ through $C_i(F)_M$. Then at step 72, controller 13 compares descriptors $C_i(P)$ and $C_i(F)$ to estimate a robustness value R_i for the ith algorithm C_i, with respect to a particular image P.

[0038] The comparison at step 72 is carried out using a comparison algorithm associated with characterizing algorithm C_i and which preferably is the same comparison algorithm used at the postal facility to compare the descriptor recovered from the scanned image with the descriptor incorporated into indicium IN. Preferably, the comparison is carried out on a characterization by characterization basis, comparing each $C_i(P)_j$ with the corresponding $C_i(F)_j$ to determine if the characterizations match; i.e., if they are "close enough" as

defined by the particular comparison algorithm used. (As a hypothetical example, where the characterizations are word lengths they may be considered to "match" if the lengths differ by no more than one or two units; while if the characterizations are the number of outliers in a word a "match" may require exact equality.)

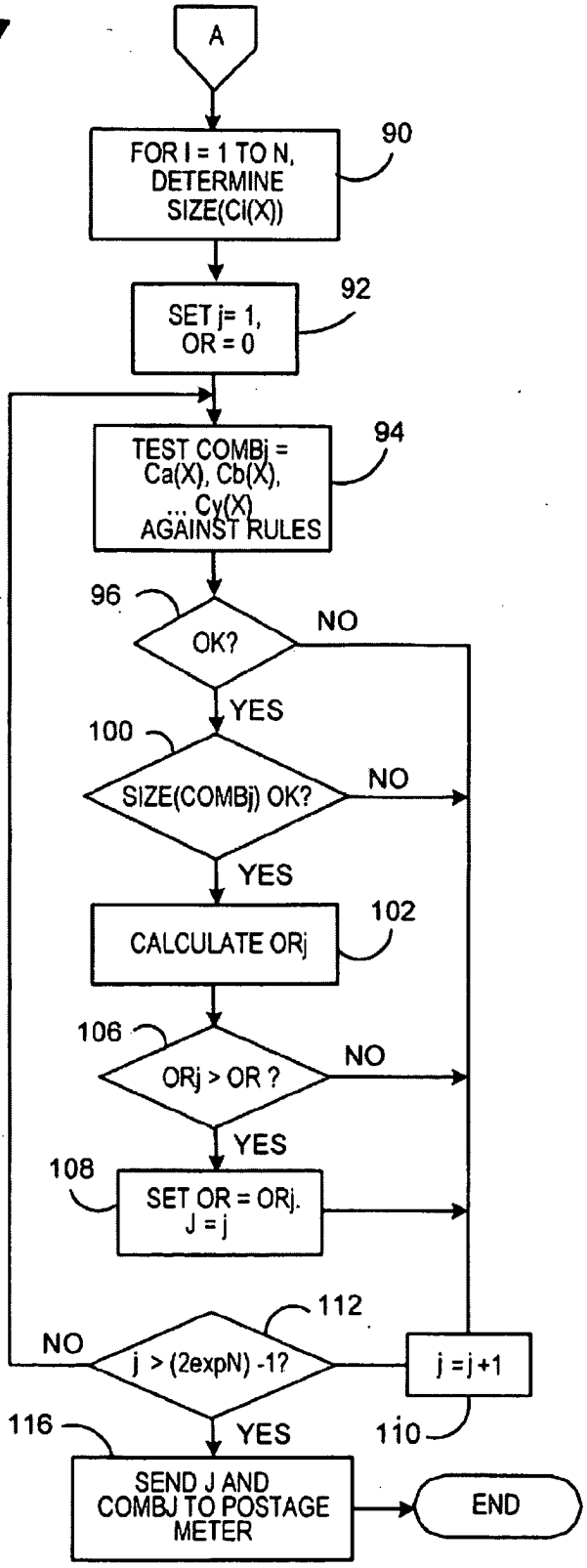
[0039] In a preferred embodiment, once descriptors $C_i(P)$ and $C_i(F)$ have been compared an estimate R_i for the robustness of algorithm C_i, with respect to particular image P, is calculated as:

$$R_i = \text{Total no. of } [C_i(P)_j \text{ matching } C_i(F)_j]/M \text{ (for } j = 1 \text{ through } M);$$

where M is the number of characterizations generated by C_i. (Note that since robustness is defined with respect to small changes in the image, in normal use the filters, and the printing and scanning processes, will be such that the descriptors $C_i(P)$ and $C_i(F)$ will have the same number of characterizations. Otherwise an error condition is generated.)

[0040] Once estimate R_i is determined at step 74, controller 13 stores R_i and $C_i(X)$; where, in different embodiments of the subject invention, X can be P or F. That is, the descriptors incorporated into indicium IN can be based on either pristine image P or filtered image F. Then, at step 78, controller 13 sets i = i+1 and, at step 80 determines if i > N, where N is the number of algorithms to be evaluated. If so, controller 13 returns to step 66 to process the next algorithm; and otherwise goes to Figure 7.

FIG. 7


A
FOR I = 1 TO N, DETERMINE SIZE(Ci(X))
90
SET j= 1, OR = 0
92
TEST COMBj = Ca(X), Cb(X), ... Cy(X) AGAINST RULES
94
96
OK?
NO
YES
100
SIZE(COMBj) OK?
NO
YES
CALCULATE ORj
102
106
ORj > OR ?
NO
YES
108
SET OR = ORj. J = j
112
NO
j > (2expN) -1?
j = j +1
110
116
YES
SEND J AND COMBJ TO POSTAGE METER
END

[0041] In Figure 7, at step 90 controller 13 determines the size of all descriptors which have been generated, i.e. the number of bytes required to express each descriptor, and at step 92 sets index j = 1 and variable OR = 0.

[0042] Then, at step 94 controller 13 tests the jth combination, $COMB_j$ = $C_a(X)$, $C_b(X)$, ... $C_y(X)$ against predetermined rules. In a preferred embodiment, this is carried out by a table look-up which determines whether or not $COMB_j$ is permitted. Such table can be up dated off-line in response to accumulated experience or heuristic experimentation. As a hypothetical example, the rules might require that a particular descriptor be included in permitted combinations while prohibiting other particular sub-combinations of descriptors. In other embodiments, each combination is logically tested against the rules to determine if the combination is permitted.

[0043] Then at step 96, if it is determined that $COMB_j$ is permitted, then at step 100 controller 13 determines if the size of $COMB_j$ is small enough to fit in the available space in indicium IN. If so, then at step 102 controller 13 calculates OR_j, the overall robustness of $COMB_j$. Preferably:

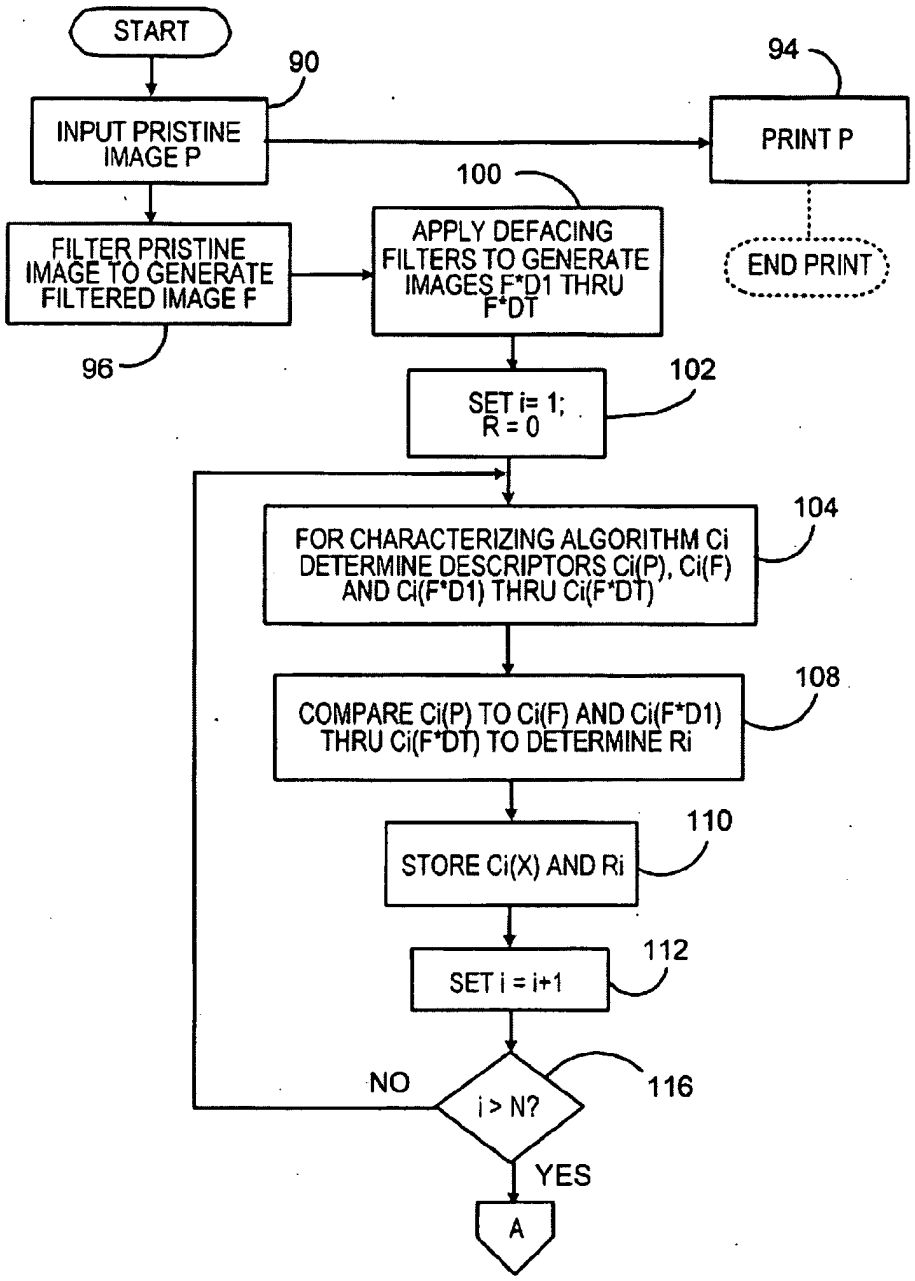
$$OR_j = avg(R_a, R_b, \ldots R_y)$$

Then, at step 106 controller 13 determines if $OR_j > OR$, and if so at step 108, sets

$OR = OR_j$.

[0044] Then, or if the results at steps 96, 100 or 106 are negative, at step 110 controller 13 sets j = j+1, and at step 112 determines if $j > 2^N-1$, that is if all combinations have been processed. If not, controller 13 returns to step 94 to process the next combination, and otherwise at step 116 sends J and $COMB_J$ to meter 16 for incorporation into indicium IN. The postal facility can then recover J to identify $COMB_J$ and use $COMB_J$ to validate indicium IN as will be described below.

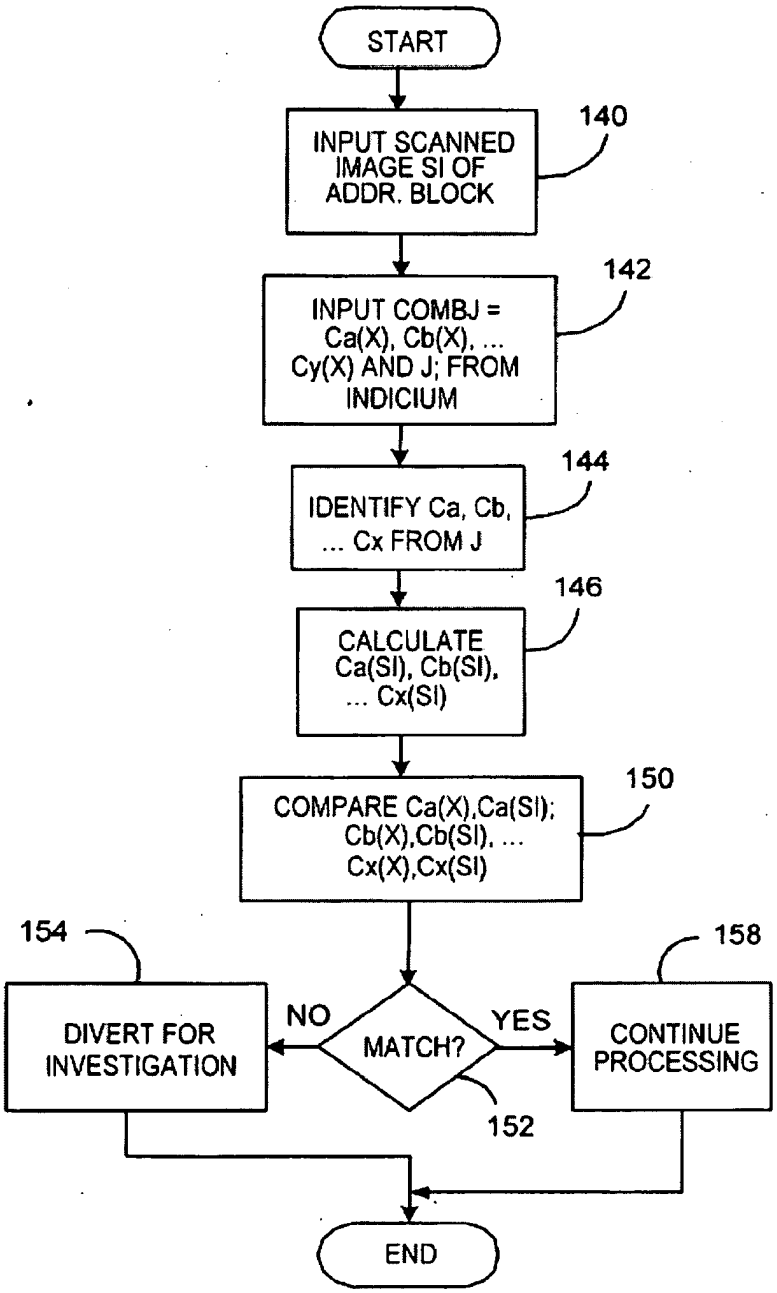
FIG. 8



[0045] Figure 8 shows a flow diagram of the operation of controller 13 in accordance with another embodiment of the subject invention. Similar to the above described embodiment, at step 90, controller 13 obtains pristine digital image, P, of address block A, at step 94 carries out printing of address block A

concurrently with the selection of a characterizing algorithm and, at step 96 inputs a print/scan filter.

FIG. 10



[0053] Figure 10 shows a flow diagram of the operation of verification system 30 in verifying indicium IN. After envelope E is scanned by camera 27, at step 140 verification controller 125 inputs a digital scanned image SI of address block A, and at step 142 inputs $COMB_J = C_a(X), C_b(X), \ldots C_y(X)$ and index value J. At step 144 controller 25 identifies algorithms $C_a, C_b, \ldots C_y$ from index value J, at step 146 calculates descriptors $C_a(SI), C_b(SI), \ldots C_y(SI)$, and at step 150 compares corresponding descriptors. At step 152, if the descriptors do not match controller 25 activates diverter 29 at step 154 to divert envelope E for inspection; and otherwise, at step 158 sends envelope E on for normal processing.

[0054] At step 150, in a preferred embodiment, the descriptors are determined not to match if any pair of characterizations do not match. That is if for any i,k the characterizations $C_i(X)_k$, $C_i(SI)_k$ do not match then at step 152 no match is found. Preferably comparisons are made using comparison algorithms associated with each of characterizing algorithms Ci, and stores in data store 28. In other embodiments, a predetermined threshold number of characterizations which fail to match is required before no overall match is found. In still other embodiments, this threshold may vary between 1 and another predetermined value or values associated with particular combinations j and stored in data store 28. In other embodiments threshold values are specified in indicium IN.

Claim 12 is the second of the two independent claims in this Patent Application.

Appellants invention claimed in claim 12, claims a secure indicia printing system for generating and printing an indicium on an object, said object having other material printed thereon. The system comprises:

a) a printer for printing said indicium; (20, Fig 2, Paragraph 0024, Page 8, Lines 1-3)

b) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being

programmed to: (Paragraphs 0027-0028, Page 10, lines 1-10, Paragraph 0028, Lines 1-7)

b1) determine estimates of robustness for each algorithms in a predetermined set of algorithms; and (Paragraph 0047, Page 18, Lines 1-7, Paragraph 0048, Page 19, Lines 1-6)

b2) select, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information; and (Paragraph 0049, Page 18, Lines 1-6, Paragraph 0050, Page 19, Lines 1-8, Paragraph 0051, Page 19, Lines 1-9, Paragraph 0052, Page 20, Lines 1-5)

b3) output said selected combination of descriptors;

c) a meter, said meter communicating with said processor to receive said descriptor, and having a communications link for receiving other information from another information source, and communicating with said printer, for; (Paragraph 0042, Page 16, Lines 1-8)

c1) cryptographically authenticating said combination of descriptors and other information; (Paragraph 0011, Page 6, Lines 1-8)

c2) generating said indicium to be representative of said cryptographically authenticated descriptor and information; and (Paragraph 0031, Page 11, Lines 1-19)

c3) controlling said printer to print said indicium on said object; (Paragraph 0034, Page 13, Lines 1-19) whereby

d) said object's relationship to said indicium can be verified by regenerating said first characterizing information descriptor from said other printed material and comparing said regenerated descriptor with said descriptor recovered from said indicium, and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material. (Paragraph 0034, Page 13, Lines 1-19).

The portions of Appellant's invention claimed in claim 12, are shown in paragraph 0011 of page 6, paragraph 0024 of page 8 to paragraph 0028 of page

10, paragraph 0035 of page 14 to paragraph 0045 of page 17 to paragraphs 0053 -0054 of pages 20-21 of appellants specification, which has been set forth above. In addition claim 12 is shown in paragraphs 0031 to 0052 of page 11 to page 20. Claim 12 is also illustrated in Figs. 2, 3, 5-8 and 10.

[0031] Another algorithm in which the characterizing information comprises a description of the shape of the address block is shown in Figure 5. The shape is determined by using a conventional "best fit" scanning algorithm which encloses address block A with "best fit" closed curve 50. (It should be understood that various algorithms for generating a best fit curve will generate different curves. These differences do not affect the subject invention so long as the same algorithm is used to generate the curve whose description is incorporated into the indicium and to recover the curve from the address block when the indicium is validated.) Preferably, curve 50 is constrained. That is the manner in which a curve can be generated is limited so that the resulting curve is simplified and can be described with limited information. In Figure 5, curve 50 is formed from linked straight line segments, such as segment 51, which are limited to eight "directions", up (U), down (D), left (L), right I, up-right (UR), up-left (UL), down-right (DR), and down-left (DL); viewed as being generated starting in the upper left corner of address block A and traveling clockwise around address block A. Preferably the curve 50 also accounts for spaces between characters, words and lines, treating these spaces as equivalent to printed space, so that curve 50 does not become too convoluted and require extensive descriptive information. It is within the skill of a person skilled in the art to provide an algorithm which will generate robust and compact characterizing information, as described above.

[0032] The characterizing information, i.e.. the description of curve 50, can be encoded in a number of ways. In the present example, the characterizing information consists of only the directions, without lengths, of each successive line segment.

[0033] Programming of a data processor to analyze scan data to perform imaging operations such as identifying lines and words, measuring the dimensions of letters and words or fitting a curve to an image in accordance with predetermined constraints are well known. Such operations are substantially routine in the character and general pattern recognition arts, for example. Techniques for carrying out such operations are also taught in: Handbook of Pattern Recognition and Image Processing edited by T Young and K-S Fu, Academic Press, 1986 and need not be discussed further here for an understanding of the subject invention.

[0034] Bit streams such as those describe above comprise ordered sequences of values which are typically, though not necessarily, numeric values associated with words in the address block. (Such bit streams are hereinafter sometimes "characterizing information descriptors" or "descriptors" and such values are hereinafter sometimes "characterizations".) As described above, when an indicium is validated, i.e., tied to the mail piece on which it is printed, at a distant postal facility the descriptor generated from the pristine image and incorporated into the indicium is compared with a descriptor recovered from an image scanned from the address block printed on the mail piece. It will be apparent to those skilled in the art that the recovered image will be transformed with respect to the pristine image by the characteristics of the printing and scanning processes, as well as possibly by the occurrence of occasional events such as blots. Thus, it is important that the algorithm used to characterize the address block be robust; that is that it produces descriptors that match sufficiently when an indicium is valid, and do not match for invalid indicia, despite small differences between the scanned image and the pristine image. It will also be apparent that the robustness of a particular characterizing algorithm can vary for different address blocks. (As a hypothetical example, the above described algorithm based on word length may be less robust for address blocks printed in a small font while algorithms based on the number of outliers, or address block shape may be relatively insensitive to font size.)

[0035] Figure 6 shows a flow diagram of the operation of controller 13 in accordance with one embodiment of the subject invention. At step 60, controller 13 obtains a pristine digital image, P, of address block A from a conventional source (not shown) such as a data processing system for preparing a bulk mailing. At step 62, controller 13 carries out printing of address block A in a conventional manner. Preferably, this printing process is carried out concurrently with the selection of a characterizing algorithm but, in other embodiments of the subject invention, printing of address block A can be carried out sequentially or by a separate processor.

[0036] At step 64, controller 13 inputs a print/scan filter which simulates the printing process of printer 14 and the scanning process to be carried out at a remote postal facility from data store 26 and applies it to image P to generate a filtered image, F, which approximates the image which will be scanned from the mail piece at the postal facility. And at step 66 sets index i equal to 1 and variable R equal to 0.

[0037] At step 66 controller 13 sets index i = 1 and variable R = 0, and at step 70

applies the ith characterizing algorithm C_i to images P and F to generate corresponding descriptors $C_i(P)$ and $C_i(F)$; each comprising a sequence of M characterizations, or values, $C_i(P)_1$ through $C_i(P)_M$; $C_i(F)_1$ through $C_i(F)_M$. Then at step 72, controller 13 compares descriptors $C_i(P)$ and $C_i(F)$ to estimate a robustness value R_i for the ith algorithm C_i, with respect to a particular image P.

[0038] The comparison at step 72 is carried out using a comparison algorithm associated with characterizing algorithm C_i and which preferably is the same comparison algorithm used at the postal facility to compare the descriptor recovered from the scanned image with the descriptor incorporated into indicium IN. Preferably, the comparison is carried out on a characterization by characterization basis, comparing each $C_i(P)_j$ with the corresponding $C_i(F)_j$ to

determine if the characterizations match; i.e., if they are "close enough" as defined by the particular comparison algorithm used. (As a hypothetical example, where the characterizations are word lengths they may be considered to "match" if the lengths differ by no more than one or two units; while if the characterizations are the number of outliers in a word a "match" may require exact equality.)

[0039] In a preferred embodiment, once descriptors $C_i(P)$ and $C_i(F)$ have been compared an estimate R_i for the robustness of algorithm C_i, with respect to particular image P, is calculated as:

R_i = Total no. of [C_i $(P)_j$ matching $C_i(F)_j$]/M (for j = 1 through M);

where M is the number of characterizations generated by C_i. (Note that since robustness is defined with respect to small changes in the image, in normal use the filters, and the printing and scanning processes, will be such that the descriptors $C_i(P)$ and $C_i(F)$ will have the same number of characterizations. Otherwise an error condition is generated.)

[0040] Once estimate R_i is determined at step 74, controller 13 stores R_i and $C_i(X)$; where, in different embodiments of the subject invention, X can be P or F. That is, the descriptors incorporated into indicium IN can be based on either pristine image P or filtered image F. Then, at step 78, controller 13 sets i = i+1 and, at step 80 determines if i > N, where N is the number of algorithms to be evaluated. If so, controller 13 returns to step 66 to process the next algorithm; and otherwise goes to Figure 7.

[0041] In Figure 7, at step 90 controller 13 determines the size of all descriptors which have been generated, i.e. the number of bytes required to express each descriptor, and at step 92 sets index j = 1 and variable OR = 0.

[0042] Then, at step 94 controller 13 tests the jth combination, $COMB_j$ = $C_a(X)$, $C_b(X)$, ...$C_y(X)$ against predetermined rules. In a preferred embodiment,

this is carried out by a table look-up which determines whether or not $COMB_j$ is permitted. Such table can be up dated off-line in response to accumulated experience or heuristic experimentation. As a hypothetical example, the rules might require that a particular descriptor be included in permitted combinations while prohibiting other particular sub-combinations of descriptors. In other embodiments, each combination is logically tested against the rules to determine if the combination is permitted.

[0043] Then at step 96, if it is determined that $COMB_j$ is permitted, then at step 100 controller 13 determines if the size of $COMB_j$ is small enough to fit in the available space in indicium IN. If so, then at step 102 controller 13 calculates OR_j, the overall robustness of $COMB_j$. Preferably:

$$OR_j = avg(R_a, R_b, \ldots R_y)$$

Then, at step 106 controller 13 determines if $OR_j > OR$, and if so at step 108, sets

$OR = OR_j$.

[0044] Then, or if the results at steps 96, 100 or 106 are negative, at step 110 controller 13 sets $j = j+1$, and at step 112 determines if $j > 2^N-1$, that is if all combinations have been processed. If not, controller 13 returns to step 94 to process the next combination, and otherwise at step 116 sends J and $COMB_J$ to meter 16 for incorporation into indicium IN. The postal facility can then recover J to identify $COMB_J$ and use $COMB_J$ to validate indicium IN as will be described below.

[0045] Figure 8 shows a flow diagram of the operation of controller 13 in accordance with another embodiment of the subject invention. Similar to the above described embodiment, at step 90, controller 13 obtains pristine digital image, P, of address block A, at step 94 carries out printing of address block A concurrently with the selection of a characterizing algorithm and, at step 96 inputs a print/scan filter.

[0046] At step 100 controller 13 inputs defacing filters D_1 through D_T (described above) and applies each of these filters to filtered image F to generate defaced images $F*D_1$ through $F*D_T$ which approximate scanned images of address blocks which have been defaced by occasional events such as blots. At step 102 controller 13 sets index i equal to 1 and variable R equal to 0.

[0047] At step 104 controller 13 applies the ith characterizing algorithm C_i to images P, F and $F*D_1$ through $F*D_T$ to generate corresponding descriptors $C_i(P)$, $C_i(F)$ and $C_i(F*D_1)$ through $C_i(F*D_T)$; each comprising a sequence of M characterizations, or values, $C_i(P)_1$ through $C_i(P)_M$; $C_i(F)_1$ through $C_i(F)_M$, etc. Then at step 108, controller 13 compares descriptors $C_i(P)$ with descriptors $C_i(F)$ and $C_i(F*D_1)$ through $C_i(F*D_T)$ to estimate a robustness value R_i for the ith algorithm C_i, with respect to a particular
image P.

[0048] In a preferred embodiment, once descriptors $C_i(P)$ and $C_i(F)$ have been compared an estimate R_i for the robustness of algorithm C_i, with respect to particular image P, is calculated as:

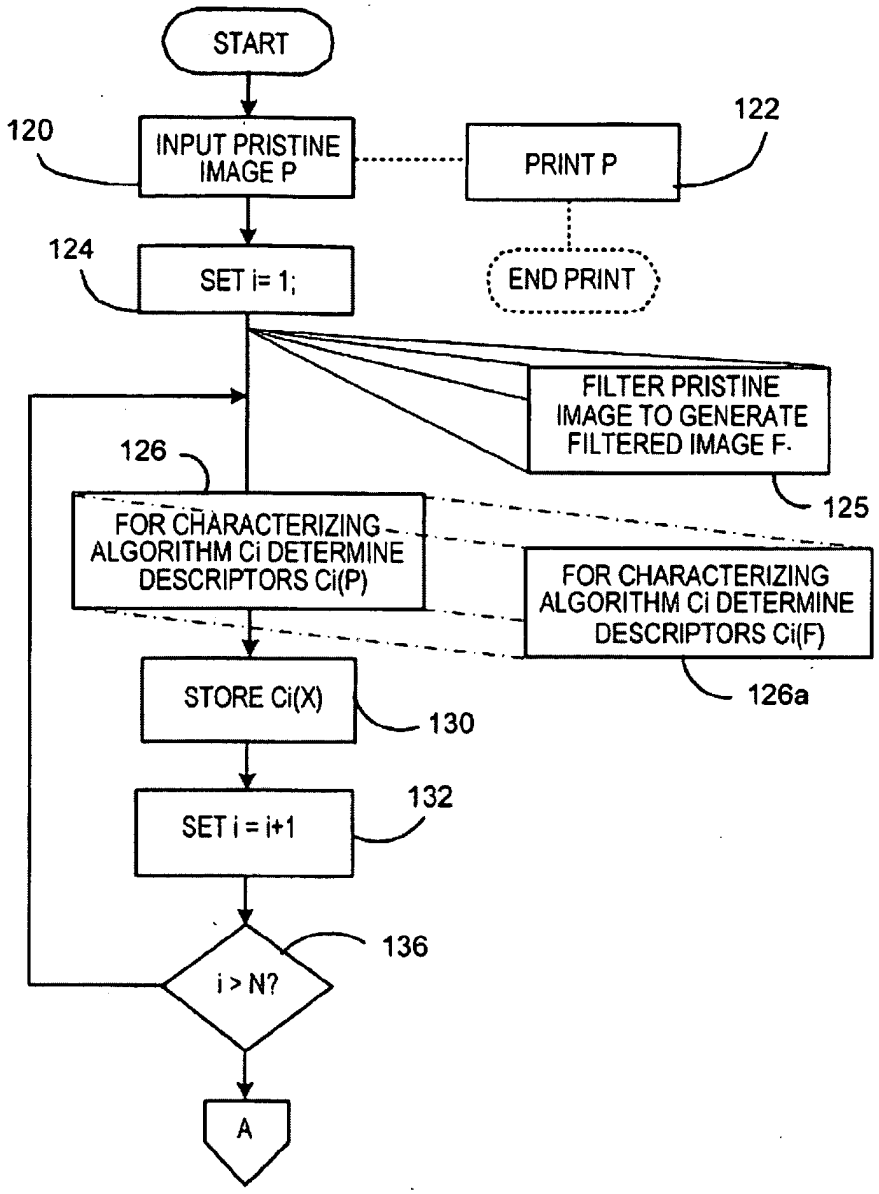
R_i = Total no. of: [$C_i(P)_j$ matching $C_i(F)_j$ (for j = 1 through M) +

$C_i(P)_j$ matching $C_i(F*D_k)_j$/M (for j = 1 through M, k =1 through T)]/M(T+1);

where M is the number of characterizations generated by C_i.

[0049] Again similar to the embodiment described above, once estimate R_i is determined at step 110 controller 13 stores $C_i(X)$ (where again X can be either P or F depending upon the embodiment) and R_i. At step 112, controller 13 sets i = i+1, and at step 116 determines if i+1 is greater than N, the number of characterizing algorithms stored. If not, controller 13 returns to step 104 to test the next algorithm. Otherwise, at step 120, controller 13 goes to Figure 7 and continues as described above.

FIG. 9



[0050] Figure 9 shows a flow diagram of the operation of controller 13 in accordance with another embodiment of the subject invention in which estimates of the robustness of algorithms C_i have been previously obtained and stored. Such estimates can be predetermined on the basis of experience with use or heuristic experimentation, or in any other convenient manner. Again, at step 120 controller 13 obtains pristine digital image, P, of address block A, at step 122

carries out printing of address block A concurrently with the selection of a characterizing algorithm and, at step 124 sets index i = 1.

[0051] In a preferred embodiment, at step 126, controller 13 applies algorithm C_i to image P to generate descriptor $C_i(P)$. In another embodiment, additional step 125 is carried out immediately after step 124 to generate filtered image F, and step 126a is substituted for step 126 to generate descriptor $C_i(F)$. At step 130, controller 13 stores $C_i(X)$ (where again X can be either P or F depending upon the embodiment). At step 132 controller 13 sets i=i+1 and at step 136 determines if i+1 is greater than N, the number of characterizing algorithms stored. If not, controller 13 returns to step 126 (or 126a depending upon the embodiment) to test the next algorithm. Otherwise, at step 136, controller 13 goes to Figure 7 and continues as described above.

[0052] It is anticipated that other estimates for robustness of characterizing algorithms will be developed as experience with different applications is gained or will be apparent to those skilled in the art. Accordingly, it should be understood that, except for particular recitations in the claims below and equivalents thereof, details of particular estimates used form no part of the subject invention.

VI. Grounds of Rejection to be Reviewed on Appeal

1. Whether or not Claims 1-11 comply 35 USC § 112 second paragraph for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention.

A. Whether or not claims 1-5 and 7-11 are patentable under 35 USC § 101 because the claimed invention is directed to non-statutory subject matter.

B. Whether or not claim 1 is patentable under 35 USC § 102(b) for being anticipated by Bradford (U.S. Patent Number 5,805,767).

C. Whether or not claims 2-6, 10 and 11 are patentable under 35 USC § 103(a) over Bradford in view of Gatto U.S. Patent Number 6,344,906.

D. Whether or not claims 7-9 and 12-20 are patentable under 35 USC § 103(a) over Bradford and Gatto and further in view of Montgomery et al. (U.S. 2003/0101148).

E. Whether or not claim 12 is patentable over application number 10/719,050 now U.S. Patent 7,475,041 because of nonstatutory obviousness type double patenting.

VII. Argument

1. The Examiner rejected claims 1-11 under 35 USC § 112 for failing to particularly point out and distinctly claim the subject matter which Appellants regard as the invention.

The Examiner stated the following in page 7 the Final Rejection :

Claims 1-11 are rejected under 35 D.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The word "uniqueness" in step g of claim 1 is considered indefinite. Printed material can be unique in multiple ways, such as: format, data, color, or position. As there is no indication what makes an indicia unique in the claim or specification, one of ordinary skill in the art would not understand what kind of determination is needed in this step. This limitation has been interpreted by the Examiner to be a comparison between the filtered and unfiltered image when applying the prior art.

In step f, claim 1 recites, "scanning said indicia." There is no recitation of printing the indicia or it being on a medium where it can be scanned from. Therefore, one of ordinary skill would not understand what has to be performed in order to infringe this claim. For purposes of prior art, scanning in this instance, has been interpreted as going through the data or browsing.

The word "unique" in step g of claim 1 is not indefinite. The word "unique" in claim 1 has its normal dictionary definition, i.e., one of a kind. Thus in step g of

claim 1 the word uniqueness means how does the indium differ from the information obtained from step f.

The Examiner is of the opinion that there is no recitation in claim 1 of printing the indicia or it being on a medium where it can be scanned from. Step a of claim 1 scans printed material, steps d and e of Claim 1 indicate that the indicia is a component of the printed material.

A. Claims 1-5 and 7-11 have been rejected by the Examiner under 35 USC under 35 USC § 101 because the claimed invention is directed to non-statutory subject matter.

The claimed invention provides a block of printed text which will be able to distinguish the selected block of text from other such blocks. It provides an image-based characterization of printed material which can be incorporated into an indicia. The claimed invention utilizes an algorithm and includes scanning, filtering and printing steps.

Thus statutory subject matter is claimed.

B. Claim 1 has been rejected by the Examiner under 35 USC § 102(b) for being anticipated by Bradford (U.S. Patent Number 5,805,767).

Bradford disclose the following in the abstract.

> In an optical character recognition (OCR) system an improved method and apparatus for recognizing the character and producing an indication of the confidence with which the character has been recognized. The system employs a plurality of different OCR devices each of which outputs a indicated (or recognized) character along with the individual devices own determination of how confident it is in the indication. The OCR system uses that data output from each of the different OCR devices along with other attributes of the indicated character such as the relative accuracy of the particular OCR device indicating the character to choose the select character recognized by the system and to produce a combined confidence indication of how confident the system is in its recognition.

Bradford discloses in the abstract how to combine an output from a multitude of OCR devices to determine the identity of a single character and a confidence level that can be associated with the accuracy of the determinations.

In Figs. 7A and 7B, Bradford depicts a human-readable description of common PDA results or Fig. 6D for OCR's 1-3.

In Fig 6D, col. 14, line 5 Bradford provides a description between a multiply of OCR device.

Fig. 7A-7B of Bradford provides information on how the word are segmented into characters i.e., number of spacer before the character positioning information. Bradford determines if the three OCR devices are referring (in their determination of character identity) to the same character.

Bradford does not disclose or anticipate steps B, C, D, E, F, and G of claim 1 as amended namely:

b) applying a predetermined set of algorithms for computing characterizing information;

c) determining estimates of robustness for each algorithm in said predetermined set of algorithms;

d) selecting, as a function of said estimates, said combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information;

e) including said characterizing information into a secure indicia;

f) scanning said indicia and said printed block; and

g) determining uniqueness of said indicia using information obtained from step f

and those claims dependent thereon.

Bradford discloses how to take OCR and run it against text and determine which way you obtain the highest confidence level in the result.

Bradford does not teach how to modify the OCR engine to achieve a high confidence level.

Appellant takes different algorithms that define different descriptors and access the algorithm to find the descriptor with the descriptors with the highest level of robustness.

The problem that Appellant is solving is the problem of finding robust algorithms for determinations of further of a printed text block that are invariant with regard to a multitasks of defects and imperfectness of the printed text block. The problem that Bradford solves is the problem of finding a most plausible identify of a given character providing that there are multiple algorithms designed to determine and identify.

C. Claims 2-6, 10 and 11 have been rejected by the Examiner under 35 USC § 103(a) over Bradford in view of Gatto U.S. Patent Number 6,344,906.

In addition to the Arguments made above please consider the following. Gallo discloses the following in lines 37-45 of col. 10.

> The Image Sensor Control Unit 40 of FIG. 8 is capable of controlling a predetermined number of linear sensors simultaneously, a predetermined number of video outputs simultaneously from a given sensor, or a predetermined number of linear sensors having multiple video outputs simultaneously while retaining the same characteristics described in the paragraphs above. This feature is useful for duplex scanners, color scanners and multi-outputs linear sensors.

Gatto describes different image enhancement techniques Bradford and/or Gatto does not disclose or anticipate a filter designed to degrade the image and determine the robustness of the descriptors.

Gatto discloses the following in col. 8 of line 1-59.

> FIG. 8 shows the architecture of the Universal Document Scanner Controller according to the present invention. The Universal Document Scanner Controller according to the present invention is a circuit 37 that integrates all of the control functions that are required to operate sheet-fed scanners, flatbed scanners, handheld scanners, slides scanners, duplex scanners, drum scanners and 2D still-image scanners. The Universal Document Scanner Controller is composed of twenty specialized units: the

Light Source Control Unit 39, the Image Sensor Control Unit 40, The Anti-Skew Auto-Start Unit 41, the Pixel Correction Unit 42, the Black Sides Removal Unit 43, the Adaptative Thresholding Unit 44, the Image Enhancement Unit 45, the Motor Control Unit 46, the Rotary Encoder Control Unit 47, the Clock Generator Unit 48, the Memory Control Unit 49, the Host Interface Control Unit 50, the Packing Unit 51, the Image Compression Unit 52, the Up/Down Sampling Unit 53, the Dithering Unit 54, the General Purpose Status and Control Unit 55, the Power Management Unit 56, the Pattern Recognition Unit 57 and the Mouse Control Unit 58. The twenty specialized units are interconnected to and intercommunicate via an internal bus 38. Additional elements 59, 60, 61 and 62 may be integrated into the Universal Document Scanner Controller according to the present invention. These additional elements are: a Library Synthesized Core CPU 59 (Central Processing Unit), DSP (Digital Signal Processor) and/or Memory, a Print and/or Graphics and/or keyboard Controller 60, a Modem 61 or other communications device and ADCs (Analog to Digital Converters) and/or DACs (Digital to Analog Converters) 62. Elements 59, 60, 61 and 62 are also connected and communicate via the internal bus 38.

The Universal Document Scanner Controller does not make use of programmed instructions stored in external memory to operate the specialized functions. Indeed, the Universal Document Scanner Controller according to the present invention relies essentially on direct interconnections between electronic gates to perform the specialized functions of at least the units 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57 and 58. Intercommunication between these units is carried out via the internal bus 38. The Universal Document Scanner Controller executes all of the specialized functions at extremely high speed because it makes use of hard-wired or microcoded specialized circuits instead of software programmed instructions. The host processor that communicates with the Universal Document Scanner Controller via the Host Interface Control Unit 50 creates and maintains some configuration tables that are stored in the memory and that are used by the specialized functions. The host processor can carry out some auxiliary functions that do not require very-high speed execution such as interpretation of statuses from the General Purpose Status and Controls Unit 56. In an alternate embodiment, the core CPU 59 uses programmed instructions stored in memory to perform auxiliary tasks or functions that may be required but that do not impact the performance of the Universal Document Scanner Controller.

Gatto describes a universal scanner controller designed to execute specialized functions such as a image sampling, compression correction, thresholding and enhancement at extremely high speeds.

Gatto does not disclose how to use image filters to access the robustness of various image characterizing descriptors.

Notwithstanding the foregoing, the Examiner is also required to explain how and why one having ordinary skill in the art would have been led to modify an applied reference and/or combine applied references to arrive at the claimed invention. *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir. 1995); *In re Deuel*, 51 F.3d 1552, 34 USPQ 1210 (Fed. Cir. 1995); *In re Fritch*, 972 F.2d 1260, 23 USPQ 1780 (Fed. Cir. 1992); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988). *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S 398, 127 S.Ct. 1727, 1735 (2007) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.* (quoting Kahn, 441 F.3d at 988)). *See also, Takeda Chem. Indus., Ltd. v. Alphapharm Pty., Ltd.*, 492 F.3d 1350, 1357 (Fed. Cir. 2007) (To avoid improper use of hindsight, the Examiner must articulate "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does" in an obviousness determination. (quoting *KSR*, 127 S. Ct. at 1731)).

See also, In re Kahn, 441 F.3d 977 (Fed. Cir. 2006)(Most inventions arise from a combination of old elements and each element may often be found in the prior art. However, mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole).

D. Claims 7-9 and 12-20 are have been rejected by the Examiner under 35 USC § 103(a) over Bradford and Gatto and further in view of Montgomery et al. (U.S. 2003/0101148).

In addition to the arguments made in above please consider the following. Montgomery discloses the following in paragraph 0140.

[0140] The indexing identifier can be printed on the label 201 in various formats. For example, FIG. 19 illustrates a two-dimensional barcode 256, which represents the indexing identifier. As can be seen, the two-dimensional barcode 256 is much smaller than two-dimensional barcodes that represent a full postage indicium, because it contains much less information, i.e., a unique identifier. In this case, the unique identifier is composed of a postage vendor ID (07), user account number (500361), and piece count (1221st piece generated for this user account). In fact, the information makes the indexing identifier is so minimal, that a one-dimensional barcode can be used. For example, a Code 128 barcode 258 illustrated in FIG. 20, or postal-specific barcode topology, such as the POSTNET or PLANET barcode 260 illustrated in FIG. 21, can be used to represent the postage vendor ID, account number, and piece count of the indexing identifier. Even more alternatively, use of a barcode can be omitted altogether, and the indexing identifier id) can simply be printed on the mail piece as numerical data 262, as illustrated in FIG. 22. The numerical data 262 can be read by Optical Character Recognition (OCR) software, the speed of which is compatible with mail processing requirements. Note that although the examples in FIGS. 19, 20, 21 and 22 used the unique combinations of postage vendor ID, account number and piece count, one could alternately employ a postal authority assigned tracking number as the unique indexing identifier.

Montgomery discloses an underling identifier that can be printed on a mail piece as numeral data.

The art cited by the Examiner does not disclose or anticipate steps B, C, D, E, F, and G of claim 1 as amended and those claims dependent thereon.

E. Claim 12 is rejected by the Examiner on the ground of non-statutory obviousness type double patenting over claim 1 of application number 10/719,050 now U.S. Patent 7,475,041. Claim 12 has also been rejected by the Examiner on the ground of nonstatutory obviousness type double patenting over claim 1 of U.S. Patent Number 7,424,458.

A Terminal Disclaimer was filed with the January 23, 2009 Amendment After Final Rejection to overcome the double patenting rejection.

Will the Examiner or Board please enter the filed Terminal Disclaimer.

In conclusion, Appellant respectfully submits that the final rejection of claims 1-5, 7-16, and 18-20 is in error for at least the reasons given above and should, therefore, be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

1. A method for generating characterizing information including a plurality of descriptors for a selected block of printed material, said method comprising the steps of:

a) scanning said printed material;

b) applying a predetermined set of algorithms for computing characterizing information;

c) determining estimates of robustness for each algorithm in said predetermined set of algorithms;

d) selecting, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information;

e) including said characterizing information into a secure indicia;

f) scanning said indicia and said printed block; and

g) determining uniqueness of said indicia using information obtained from step f.

2. A method as described in claim 1 where said step c) comprises the sub-steps of:

c1) filtering a pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image; and

c3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine said estimates of robustness.

3. A method as described in claim 2 where said selected combination of descriptors comprises said second descriptors.

4. A method as described in claim 1 where said step c) comprises the sub-steps of:

c1) filtering a pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating simulate blots, smudges, failure of print elements or scanner sensors, which can not easily be incorporated into said print or scan filter to create one or more defaced images;

c3) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of said one or more defaced images; and

c4) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more corresponding defaced image descriptors to determine said estimates of robustness.

5. A method as described in claim 4 where said selected combination of descriptors comprises said second descriptors.

7. A method as described in claim 1 where said object is a mail piece and said block of printed material represents an address.

8. A method as described in claim 7 where said selected combination of descriptors is comprised in an indicium printed on said mail piece; whereby said selected combination can be recovered from said indicium for use at said remote location.

9. A method as described in claim 8 where said indicium further comprises information identifying said combination.

10. A method as described in claim 1 where selection of said combination is further based upon said descriptors' sizes.

11. A method as described in claim 1 where selection of said combination is further based upon predetermined rules.

12. A secure indicia printing system for generating and printing an indicium on an object, said object having other material printed thereon, comprising:

a) a printer for printing said indicium;

b) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being programmed to:

b1) determine estimates of robustness for each algorithms in a predetermined set of algorithms; and

b2) select, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information; and

b3) output said selected combination of descriptors;

c) a meter, said meter communicating with said processor to receive said descriptor, and having a communications link for receiving other information from another information source, and communicating with said printer, for;

c1) cryptographically authenticating said combination of descriptors and other information;

c2) generating said indicium to be representative of said cryptographically authenticated descriptor and information; and

c3) controlling said printer to print said indicium on said object; whereby

d) said object's relationship to said indicium can be verified by regenerating said first characterizing information descriptor from said other printed material and comparing said regenerated descriptor with said descriptor recovered from said indicium, and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material.

13. A system as described in claim 12 where said processor is programmed to carry out said programming step b1) by:

b1.1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

b1.2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image; and

b1.3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine said estimates.

14. A system as described in claim 13 where said selected combination of descriptors comprises said second descriptors.

15. A system as described in claim 12 where said processor is programmed to carry out said programming step b1) by:

b1.1) filtering said pristine digital image of said block of printed material with a print/scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

b1.2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating simulate blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images;

b1.3) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of said one or more defaced images; and

b2.4) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more defaced image descriptors to determine said estimates.

16. A system as described in claim 15 where said selected combination of descriptors comprises said second descriptors.

18. A system as described in claim 12 where said object is a mail piece and said block of printed material represents an address.

19. A system as described in claim 12 where selection of said combination is further based upon said descriptors' sizes.

20 A system as described in claim 12 where selection of said combination is further based upon predetermined rules.

VIII A CLAIMS APPENDIX AS THEY APPEARED IN THE JANUARY 23, 2009 AMENDMENT AFTER FINAL REJECTION

1. A method for generating characterizing information including a plurality of descriptors for a selected block of printed material, , said method comprising the steps of:

a) scanning said printed material;

b) applying a predetermined set of algorithms for computing characterizing information;

c) determining estimates of robustness for each algorithm in said predetermined set of algorithms;

d) selecting, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information;

e) including said characterizing information into a secure indicia;

f) scanning said indicia and said printed block; and

g) determining uniqueness of said indicia using information obtained from step f.

2. (Currently Amended) A method as described in claim 1 where said step c) comprises the sub-steps of:

c1) filtering a pristine digital image of said block of printed material with a ~~print/scan~~print or scan filter to create a filtered image, said ~~print/scan~~print or scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of

corresponding second characterizing information descriptors for said filtered digital image; and

c3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine said estimates of robustness.

3. (Original) A method as described in claim 2 where said selected combination of descriptors comprises said second descriptors.

4. (Currently Amended) A method as described in claim 1 where said step c) comprises the sub-steps of:

c1) filtering a pristine digital image of said block of printed material with a ~~print/scan~~print or scan filter to create a filtered image, said ~~print/scan~~print or scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

c2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating ~~simulate~~ blots, smudges, failure of print elements or scanner sensors, which can not easily be incorporated into said print or scan filter to create one or more defaced images;

c3) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of said one or more defaced images; and

c4) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more corresponding defaced image descriptors to determine said estimates of robustness.

5. (Original) A method as described in claim 4 where said selected combination of descriptors comprises said second descriptors.

6. (Cancelled)

7. (Original) A method as described in claim 1 where said object is a mail piece and said block of printed material represents an address.

8. (Original) A method as described in claim 7 where said selected combination of descriptors is comprised in an indicium printed on said mail piece; whereby said selected combination can be recovered from said indicium for use at said remote location.

9. (Original) A method as described in claim 8 where said indicium further comprises information identifying said combination.

10. (Original) A method as described in claim 1 where selection of said combination is further based upon said descriptors' sizes.

11. (Original) A method as described in claim 1 where selection of said combination is further based upon predetermined rules.

12. (Original) A secure indicia printing system for generating and printing an indicium on an object, said object having other material printed thereon, comprising:

a) a printer for printing said indicium;

b) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being programmed to:

b1) determine estimates of robustness for each algorithms in a predetermined set of algorithms; and

b2) select, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information; and

b3) output said selected combination of descriptors;

c) a meter, said meter communicating with said processor to receive said descriptor, and having a communications link for receiving other information from another information source, and communicating with said printer, for;

c1) cryptographically authenticating said combination of descriptors and other information;

c2) generating said indicium to be representative of said cryptographically authenticated descriptor and information; and

c3) controlling said printer to print said indicium on said object; whereby

d) said object's relationship to said indicium can be verified by regenerating said first characterizing information descriptor from said other printed material and comparing said regenerated descriptor with said descriptor recovered from said indicium, and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material.

13. (Currently Amended) A system as described in claim 12 where said processor is programmed to carry out said programming step b1) by:

b1.1) filtering said pristine digital image of said block of printed material with a ~~print/scan~~print or scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

b1.2) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image to generate a plurality of

corresponding second characterizing information descriptors for said filtered digital image; and

b1.3) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding said first and said second descriptors to determine said estimates.

14. (Original) A system as described in claim 13 where said selected combination of descriptors comprises said second descriptors.

15. (Currently Amended) A system as described in claim 12 where said processor is programmed to carry out said programming step b1) by:

b1.1) filtering said pristine digital image of said block of printed material with a ~~print/scan~~print or scan filter to create a filtered image, said print/scan filter simulating the expected transformation of said pristine image by printing and scanning processes;

b1.2) further filtering said filtered image with one or more defacing filters, said defacing filters simulating simulate blots, smudges, failure of print elements or scanner sensors, or other, similar occasional events which can not easily be incorporated into said print/scan filter to create one or more defaced images;

b1.3) applying each algorithm from said predetermined set of characterizing algorithms to said filtered image and to said one or more defaced images to generate a plurality of corresponding second characterizing information descriptors for said filtered digital image and one or more pluralities of defaced image descriptors corresponding to each of said one or more defaced images; and

b2.4) for each algorithm from said predetermined set of characterizing algorithms, comparing corresponding first characterizing information descriptors with corresponding second characterizing information descriptors and with each of said one or more defaced image descriptors to determine said estimates.

16. (Original) A system as described in claim 15 where said selected combination of descriptors comprises said second descriptors.

17. (Cancelled)

18. (Original) A system as described in claim 12 where said object is a mail piece and said block of printed material represents an address.

19. (Original) A system as described in claim 12 where selection of said combination is further based upon said descriptors' sizes.

20. (Original) A system as described in claim 12 where selection of said combination is further based upon predetermined rules.

21. (Withdrawn) A system for generating and printing an indicium on an object, said object having other material printed thereon, and for verifying said indicium, comprising:

a) an indicia printing system, comprising:

a1) a printer for printing said indicium;

a2) a processor for receiving a pristine digital image of said other printed material, and for processing said image to abstract characterizing information descriptive of aspects of said image from said image, said processor being programmed to:

a2.1) determine estimates of robustness for each algorithms in a predetermined set of algorithms; and

a2.2) select, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information;

a2.3) output said selected combination of descriptors; and

a3) a meter, said meter communicating with said processor to receive said combination of descriptors, and having a communications link for receiving other information from another information source, and communicating with said printer, for;

a3.1) cryptographically authenticating said combination of descriptors and said other information;

a3.2) generating said indicium to be representative of said cryptographically authenticated combination of descriptors and other information; and

a3.3) controlling said printer to print said indicium on said object; and

b) a verifying system for receiving said object and verifying said indicium, comprising:

b1) a scanner for scanning images of said indicium and said other printed material from said object;

b2) a diverter for diverting said object for further inspection;

b3) a verification controller programmed to:

b3.1) input said scanned images;

b3.2) input a combination of first descriptors from said indicium image;

b3.3) identify characterizing algorithms used to generate said first descriptors;

b3.4) apply said identified algorithms to said image of said other material to generate second descriptors;

b3.5) compare said first and second descriptors; and

b3.6) if said first and second descriptors do not match, control said diverter to divert said object for further inspection; whereby

c) said object's relationship to said indicium can be verified and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material.

22. (Withdrawn) A system as described in claim 21 where said object is a mail piece and said block of printed material represents an address.

23. (Withdrawn) A verifying system for receiving an object said object having an indicium and other material printed thereon, and for verifying said indicium, comprising:

a) a scanner for scanning images of said indicium and said other printed material from said object;

b) a diverter for diverting said object for further inspection;

c) a verification controller programmed to:

c1) input said scanned images;

c2) input a combination of first descriptors from said indicium image;

c3) identify characterizing algorithms used to generate said first descriptors;

c4) apply said identified algorithms to said image of said other material to generate second descriptors;

c5) compare said first and second descriptors; and

c6) if said first and second descriptors do not match, control said diverter to divert said object for further inspection.

24. (Withdrawn) A method for generating and printing an indicium on an object, said object having other material printed thereon, and for verifying said indicium, comprising the steps of:

a) receiving a pristine digital image of said other printed material, and processing said image to abstract characterizing information descriptive of aspects of said image from said image by:

a1) determining estimates of robustness for each algorithms in a predetermined set of algorithms;

a2) selecting, as a function of said estimates, a combination of descriptors generated by a corresponding combination of said algorithms as said characterizing information; and

b) outputting said selected combination of descriptors to a meter; said meter then b1) receiving other information from another information source;

b2) cryptographically authenticating said combination of descriptors and said other information;

b3) generating said indicium to be representative of said cryptographically authenticated combination of descriptors and other information; and

b4) controlling said printer to print said indicium on said object; then

c) transporting said object to a verifying system; said verifying system then:

c1) scanning images of said indicium and said other printed material from said object;

c2) inputting a combination of first descriptors from said indicium image;

c3) identifying characterizing algorithms used to generate said first descriptors;

c4) applying said identified algorithms to said image of said other material to generate second descriptors;

c5) comparing said first and second descriptors; and

c6) if said first and second descriptors do not match, diverting said object for further inspection; whereby

d) said object's relationship to said indicium can be verified and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material.

25. (Withdrawn) A method as described in claim 24 where said object is a mail piece and said block of printed material represents an address.

26. (Withdrawn) A method for verifying an indicium printed on an object, said object having other material printed thereon, comprising the steps of:

a) scanning images of said indicium and said other printed material from said object;

b) inputting a combination of first descriptors from said indicium image;

c) identifying characterizing algorithms used to generate said first descriptors;

d) applying said identified algorithms to said image of said other material to generate second descriptors;

e) comparing said first and second descriptors; and

f) if said first and second descriptors do not match, diverting said object for further inspection; whereby

g) said object's relationship to said indicium can be verified and copies of said indicium cannot easily be used without detection on other objects which do not include said other printed material.

IX. EVIDENCE APPENDIX

There is no additional evidence to submit.

X. RELATED PROCEEDING APPENDIX

There are no related Appeals and Interferences.